



COMPUTER TOOLS

for Planning, Conservation & Environmental Protection

In an effort to increase awareness of Internet resources available to local governments and citizen

planners the Wisconsin Department of Natural Resources (DNR) has initiated a technical assistance program focused on computer tools for planning, conservation, and environmental protection. This program has been made possible by a water quality management grant awarded to the DNR by the U.S. Environmental Protection Agency (EPA).

As part of our technical assistance program we have developed this series of articles. Each article will highlight a different tool, discuss its possible uses, and offer step-by-step tutorials. It is our hope that the information provided here will insure that all involved in local planning processes have equal access to valuable information and analysis tools. Gaining access to these free web-based planning tools will assist communities with preliminary selection of alternative approaches to watershed and community planning. When community planners, developers, and citizens have access to similar information they are more readily able to interact and jointly discover possible solutions to land use issues.

Definition of a Tool – Predictive Modeling

To help evaluate the available tools, we have sorted them into three categories – interactive mapping, data access, and predictive modeling. This article focuses on predictive modeling tools.

Computer tools give the user the ability to evaluate alternatives and predict impacts of different land use choices. These tools perform complex analyses, but provide understandable results through user-friendly interfaces.

Land use planning and decision-making processes involve careful consideration of many complex factors, including inescapable environmental consequences. A set of computer tools can take the guesswork out of these important processes by modeling potential impacts of land use change. These tools can be used to create and manipulate different scenarios to provide a better understanding of environmental change through quantitative and visual outputs. With these tools a user can set up constraints, indicators, variables, and assumptions. By changing the values of these settings the tools can interpret a new representation of the landscape.

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Land use decision-making processes can be highly contentious, fraught with uncertainties, high personal stakes, and strong emotions. These tools bring science to the process and help both the public and local governments understand the finer details and true costs of a proposed land use change. Understanding the potential consequences, both short- and long-term, can save time, money, and frustration.

Long-Term Hydrologic Impact Assessment

Land use changes can significantly impact groundwater recharge, storm water drainage, and water pollution. The Long-Term Hydrologic Impact Assessment (L-THIA) model was developed as an accessible online tool to assess the water quality impacts of land use change. Based on community-specific climate data, L-THIA estimates changes in recharge, runoff, and nonpoint source pollution resulting from past or proposed development, and is most appropriate for areas of 20 or more acres. It estimates long-term average annual runoff for land use and soil combinations, based on actual long-term climate data for that area.

As a quick and easy-to-use approach, L-THIA's results can be used to generate community awareness of potential long-term problems and to support planning aimed at minimizing disturbance of critical areas.

L-THIA is an ideal tool to assist in the evaluation of potential effects of land use change and to identify the best location of a particular land use to minimize negative impacts on a community's natural environment.



How to Access L-THIA

Using your Internet browser, go to
www.ecn.purdue.edu/runoff/lthianew.

1. Select which mode you would like to run L-THIA in.* Multiple versions of L-THIA are available for use. All versions model runoff and 14 nonpoint source pollutants in surface waters and provide the output in tabular and graphical representations. The web-based versions allow any user to input local land use and soil information and receive results over the Internet. A web-based GIS version allows users to obtain watershed level land use and soil data to automatically complete L-THIA data inputs. The desktop GIS version automates the process of impact modeling within the ArcView GIS tool.

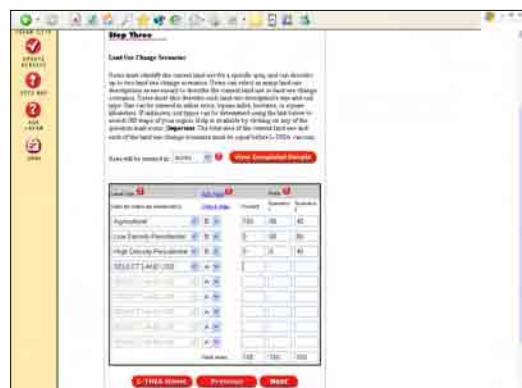
*This fact sheet describes the basic L-THIA model.



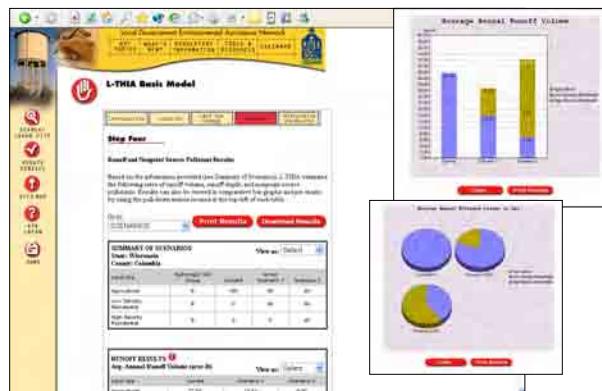
Step One introduces you to background information about data used to run the model. Click <Next> to advance to Step Two.

In **Step Two** you enter your location first by choosing your state and then your county. Click <Next> to continue.

Step Three asks you to enter your land use change scenario. You will need to know three things: (1) what the current land uses are (e.g., forests, agriculture, low-density residential, etc.), (2) the size area of interest (measurable in acres, or miles, or kilometers, etc.), and (3) the soil type for the area. There is a link to help you discover the soil type just above the soil column. Click on "Check Map" to open a map of the state. Use your cursor to draw a box around the area of interest. Check the box to make the Soils Layer active and when the map refreshes, check the color-coding against the soil legend on the right side of the page.



After inputting your current land uses, enter up to two scenarios about how that land use might change. Once you have completed your scenario click <Next> at the bottom of the page to run the model.



After the model has run, **Step Four** will present you with tabular data about how water quality is affected by the land use changes you input. The outputs include:

- Average annual runoff volume
 - Average annual runoff depth
 - Average runoff depth by land use
- And the following nonpoint source pollutants:
- Nitrogen – Chromium – Phosphorus
Nickel – Suspended solids – BOD
Lead – COD – Copper – Oil and grease
Zinc – Fecal coliform – Cadmium – Fecal strep

You can also view the data in pie chart or bar graph form by using the drop down menu at the top of each data table. The model also provides you with help interpreting the results by clicking <Next> at the bottom of the results page.

L-THIA was developed by Bernard Engel, Ph.D. and Jon Harbor, Ph.D., Purdue University with funding from the U.S. Environmental Protection Agency, Region 5. For more information about L-THIA you can contact Dr. Engel at engelb@ecn.purdue.edu.

For More Information:

www.dnr.state.wi.us/org/es/science/landuse
WDNR's land use website



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